

# C L A I M S

1. An image encoding method characterized by  
2 comprising the steps of:  
3       generating a transformation coefficient by  
4 transforming an image from a spatial domain into a  
5 frequency domain; and  
6       quantizing the transformation coefficient by  
7 using the same quantization width as that at the time of  
8 decoding with a quantization characteristic different  
9 from a quantization characteristic at the time of  
10 decoding.

2. An image encoding method according to  
2 claim 1, characterized in that the step of quantizing  
3 comprises the step of quantizing the transformation  
4 coefficient using a dead zone.

3. An image encoding method according to  
2 claim 2, characterized by further comprising the step of  
3 setting a dead zone width.

4. An image encoding method according to  
2 claim 3, characterized in that the step of setting the  
3 dead zone width comprises the step of setting the dead  
4 zone width for said each transformation coefficient.

5. An image encoding method according to  
2 claim 3, characterized in that the step of setting the  
3 dead zone width comprises the step of, when a set of  
4 blocks each including a plurality of transformation  
5 coefficients as constituent elements are to be quantized

6 with the same quantization width, setting the dead zone  
7 width for said each block.

6. An image encoding method according to  
2 claim 3, characterized in that the step of setting the  
3 dead zone width comprises the step of adaptively  
4 changing the dead zone width.

7. An image encoding method according to  
2 claim 4, characterized in that the step of setting the  
3 dead zone width comprises the step of setting the dead  
4 zone width to a smaller width for a transformation  
5 coefficient with higher visual sensitivity in a  
6 frequency domain, and setting the dead zone width to a  
7 larger width for a transformation coefficient with lower  
8 visual sensitivity in a frequency domain.

8. An image encoding method according to  
2 claim 5, characterized in that the step of setting the  
3 dead zone width comprises the step of setting the dead  
4 zone width to a smaller width for a block with higher  
5 visual sensitivity in a spatial domain, and setting the  
6 dead zone width to a larger width for a block with lower  
7 visual sensitivity in a spatial domain.

9. An image encoding method according to  
2 claim 6, characterized in that the step of changing the  
3 dead zone width comprises the step of adaptively  
4 changing the dead zone width in accordance with a  
5 flatness of the image.

10. An image encoding method according to

2 claim 9, characterized by further comprising the step of  
3 calculating a flatness of the image from at least one of  
4 a prediction mode of the image, a direction of  
5 intra-frame prediction of the image, motion of the  
6 image, a direction of inter-frame prediction of the  
7 image, an average absolute error of the image, a  
8 variance of the image, a difference between a maximum  
9 value and minimum value of the image, an average  
10 absolute error of a prediction error signal of the  
11 image, and a variance of a prediction error signal of  
12 the image.

11. An image encoding method according to  
2 claim 3, characterized in that the step of setting the  
3 dead zone width comprises the step of obtaining the dead  
4 zone width from a relationship between an ideal  
5 quantization width and a real quantization width.

12. An image encoding device characterized by  
2 comprising:  
3 transformation means for generating a  
4 transformation coefficient by transforming an image from  
5 a spatial domain into a frequency domain; and  
6 quantization means for quantizing the  
7 transformation coefficient by using the same  
8 quantization width as that at the time of decoding with  
9 a quantization characteristic different from a  
10 quantization characteristic at the time of decoding.

13. An image encoding device according to

2 claim 12, characterized in that said quantization means  
3 comprises means for quantizing using a dead zone.

14. An image encoding device according to  
2 claim 13, characterized by further comprising dead zone  
3 generating means for setting a dead zone width in said  
4 quantization means.

15. An image encoding device according to  
2 claim 14, characterized in that said dead zone  
3 generating means comprises dead zone scale generating  
4 means for setting the dead zone width for said each  
5 transformation coefficient.

16. An image encoding device according to  
2 claim 14, characterized in that said dead zone  
3 generating means comprises dead zone scale generating  
4 means for, when said quantization means quantizes a set  
5 of blocks each including a plurality of transformation  
6 coefficients as constituent elements with the same  
7 quantization width, setting the dead zone width for said  
8 each block.

17. An image encoding device according to  
2 claim 14, characterized in that said dead zone  
3 generating means comprises dead zone scale generating  
4 means for adaptively changing the dead zone width.

18. An image encoding device according to  
2 claim 15, characterized in that said dead zone scale  
3 generating means comprises means for setting the dead  
4 zone width to a smaller width for a transformation

5 coefficient with higher visual sensitivity in a  
6 frequency domain, and setting the dead zone width to a  
7 larger width for a transformation coefficient with lower  
8 visual sensitivity in a frequency domain.

19. An image encoding device according to claim  
2 16, characterized in that said dead zone scale  
3 generating means comprises means for setting the dead  
4 zone width to a smaller width for a block with higher  
5 visual sensitivity in a spatial domain, and setting the  
6 dead zone width to a larger width for a block with lower  
7 visual sensitivity in a spatial domain.

20. An image encoding device according to  
2 claim 17, characterized in that said dead zone scale  
3 generating means comprises means for adaptively changing  
4 the dead zone width in accordance with a flatness of the  
5 image.

21. An image encoding device according to  
2 claim 20, characterized by further comprising means for  
3 calculating a flatness of the image from at least one of  
4 a prediction mode of the image, a direction of  
5 intra-frame prediction of the image, motion of the  
6 image, a direction of inter-frame prediction of the  
7 image, an average absolute error of the image, a  
8 variance of the image, a difference between a maximum  
9 value and minimum value of the image, an average  
10 absolute error of a prediction error signal of the  
11 image, and a variance of a prediction error signal of

12 the image.

22. An image encoding device according to  
2 claim 14, characterized in that said dead zone  
3 generating means comprises dead zone scale generating  
4 means for obtaining the dead zone width from a  
5 relationship between an ideal quantization width and a  
6 real quantization width.

23. An image encoding control program  
2 characterized by causing a computer to function as  
3 transformation means for generating a  
4 transformation coefficient by transforming an image from  
5 a spatial domain into a frequency domain, and  
6 quantization means for quantizing the  
7 transformation coefficient by using the same  
8 quantization width as that at the time of decoding with  
9 a quantization characteristic different from a  
10 quantization characteristic at the time of decoding.

24. An image encoding control program  
2 according to claim 23, characterized in that the  
3 quantization means comprises means for quantizing using  
4 a dead zone.

25. An image encoding control program  
2 according to claim 24, characterized in that the  
3 computer is caused to function as dead zone generating  
4 means for setting a dead zone width in the quantization  
5 means.

26. An image encoding control program

2 according to claim 25, characterized in that the dead  
3 zone generating means comprises dead zone scale  
4 generating means for setting the dead zone width for  
5 said each transformation coefficient.

27. An image encoding control program  
2 according to claim 25, characterized in that the dead  
3 zone generating means comprises dead zone scale  
4 generating means for, when the quantization means  
5 quantizes a set of blocks each including a plurality of  
6 transformation coefficients as constituent elements with  
7 the same quantization width, setting the dead zone width  
8 for said each block.

28. An image encoding control program  
2 according to claim 25, characterized in that the dead  
3 zone generating means comprises dead zone scale  
4 generating means for adaptively changing the dead zone  
5 width.

29. An image encoding control program  
2 according to claim 26, characterized in that the dead  
3 zone scale generating means comprises means for setting  
4 the dead zone width to a smaller width for a  
5 transformation coefficient with higher visual  
6 sensitivity in a frequency domain, and setting the dead  
7 zone width to a larger width for a transformation  
8 coefficient with lower visual sensitivity in a frequency  
9 domain.

30. An image encoding control program according

2 to claim 27, characterized in that the dead zone scale  
3 generating means comprises means for setting the dead  
4 zone width to a smaller width for a block with higher  
5 visual sensitivity in a spatial domain, and setting the  
6 dead zone width to a larger width for a block with lower  
7 visual sensitivity in a spatial domain.

31. An image encoding control program  
2 according to claim 28, characterized in that the dead  
3 zone scale generating means comprises means for  
4 adaptively changing the dead zone width in accordance  
5 with a flatness of the image.

32. An image encoding control program  
2 according to claim 31, characterized in that the  
3 computer is caused to function as means for calculating  
4 a flatness of the image from at least one of a  
5 prediction mode of the image, a direction of intra-frame  
6 prediction of the image, motion of the image, a  
7 direction of inter-frame prediction of the image, an  
8 average absolute error of the image, a variance of the  
9 image, a difference between a maximum value and minimum  
10 value of the image, an average absolute error of a  
11 prediction error signal of the image, and a variance of  
12 a prediction error signal of the image.

33. An image encoding control program  
2 according to claim 25, characterized in that the dead  
3 zone generating means comprises dead zone scale  
4 generating means for obtaining the dead zone width from



5 a relationship between an ideal quantization width and a  
6 real quantization width.